

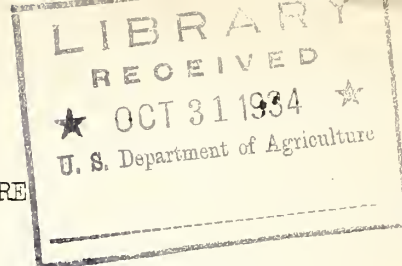
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UNITED STATES DEPARTMENT OF AGRICULTURE
Weather Bureau
Instrument Division

SPECIFICATIONS FOR THERMOMETERS, METEOROLOGICAL, MINIMUM
Mounted on corrosion resisting steel backs.



1. Stems; The stems shall be of glass, about 1/4 inch in diameter (between 7/32 inch and 9/32 inch).

2. White strip- To facilitate readings a strip of white glass shall be provided running the full length of the stem back of the bore..

3. Bulbs - The bulbs shall be spherical in form; the diameter need not be less than 3/8-inch, and must not be greater than 1/2 inch; bulb must be of clear glass, of a quality that will not change appreciably with age.

4. Length- Length of stem and bulb combined must not be less than 10-1/4 inches nor more than 10-3/4 inches.

5. Filling- Thermometers shall be filled with alcohol. The space above the alcohol to be filled with air under pressure. A suitable expansion bulb to be provided at the upper end of the stem.

6. Terminal nib- As a provision for holding the tube in its proper relation to the back when subsequently mounted, a nib approximately 3/32 inch thick will be formed at the upper end of the stem.

7. Index- In order to provide for self registration of the minimum temperature, an index made of dark colored glass and a little longer than the diameter of the bulb will be loosely fitted into each tube. The index must be well formed with rounded terminal knobs. It must retreat with the alcohol surface when the temperature falls, but must permit the alcohol to flow past it when the temperature rises.

8. Graduations- All lines, figures, and letters to be etched clean cut, and distinct. Graduations shall be to whole degrees Fahrenheit. The first and each succeeding 5 and 10 degree line to be longer than the remaining lines. Graduations to be numbered at each multiple of 10 degrees Fahrenheit, numbers below zero to be preceded by the minus sign. Figures shall be arranged to be read when the stem is horizontal with bulb to the left. The lowest line of graduation must not be nearer the bulb than a distance equal to 10 degrees of the scale. All etchings to be filled with best quality black pigment.

Each tube will bear near the upper end a serial number (indicated in the order) and the initials U. S.

9. Scale options- The approximate scale will be either minus 30 to plus 100 degrees Fahr. for use at most Weather Bureau stations, or minus 60 to plus 100 degrees Fahr. for use in Alaska and the Northwest, as may be specified in the order.

[minimum]

10. Scale error.- The error at any point of the scale must be no greater than the following:

Above 32°	0.3 degree.
At 32° (ice point)	0.2 degree.
Between 32° and zero.	0.6 degree.
Between zero and -30°	1.0 degree.
Below -30°	1.5 degree.

The change in the error for a distance of 10 degrees must be no greater than 0.3 degree on the part of the scale above 32° , nor than 0.5 degree on the part of the scale below 32° .

11. Scale length- The scale will extent over the entire usable length of tube, about $8 \frac{3}{4}$ inches, and will be as open as the scale specified in the order permits. Reasonable tolerances above and below the stated limits will be allowed, provided they do not produce an unduly compressed or open scale. The scale must not be concealed by the mounting clamps.

12. Mounting- Each thermometer tube must be mounted upon a metal back consisting of a strip of corrosion resisting steel $\frac{1}{32}$ inch thick by $\frac{29}{32}$ inch wide by 12 inches long, conforming to Navy Department Specifications 47S20a dated May 28, 1934, symbol designation CRS1, finish No. 6 Commercial polish, Tampico brushed. A circular hole $\frac{11}{16}$ of an inch in diameter must be cut in one end of the strip, forming an opening in which the bulb of the thermometer must be centrally placed. At the opposite or top end of the strip a $\frac{1}{8}$ -inch hole must be drilled, with its center $\frac{1}{4}$ -inch from the top margin. A corrugation not less than $\frac{1}{8}$ -inch deep, curved to fit the thermometer tube, must be formed in the back, the corrugation extending lengthwise from the $\frac{11}{16}$ -inch hole provided for the bulb to the position of the terminal nib of the glass stem. At the upper end of the corrugation a suitable hole must be cut through the back to receive the terminal nib described in paragraph 6.

13. Markings on backs- Graduation lines for each multiple of 5 degrees must be made on the backs opposite the corresponding graduations on the stem. Appropriate numbers must be made on the back opposite each multiple of 10 degrees. The word "MINIMUM" must be stamped across the back in a position about $\frac{5}{8}$ inch below the upper end. The serial number of the thermometer and the name of the purchasing bureau must be placed on the right hand margin.

14. Clamps - The glass tubes must be secured to the back by corrosion resisting steel strips, carefully and well made, and so formed as to properly fit and hold the tubes to the back, and attached by fillister head screws No. 0-80, made of corrosion resisting steel.

15. Workmanship- First class and thoroughly finished instruments are required. For example, stems must be straight and of uniform bore

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and free from scratches. Lines must be clean cut, without ragged edges. Bulbs must be of uniform thickness and joined to the stems in a smooth and workmanlike manner. Metal parts must be free from burrs, cracks, or rough or sharp edges, but not rounded nor beveled to any perceptible degree.

16. Each instrument will be carefully inspected and tested before acceptance; but recognizing the difficulty attending the production of a large number of thermometers that come within the limits prescribed in these specifications, it is stated that while the Weather Bureau will in its discretion strictly adhere to said specifications, yet it is not the intention to reject instruments inherently correct and of good workmanship, provided the greater part of the thermometers furnished come within the limits herein prescribed, and prove satisfactory throughout.

17. Prospective bidders will be required to furnish evidence of their ability to produce and deliver in the quantity required thermometers of the character indicated in the above specifications.

18. There must be no change in the ice point measureable by customary methods of testing during a period of 90 days. The right is reserved to delay payment for a period of 90 calendar days for the purpose of making repeat tests to determine shift of the ice point.

B. C. Kadel,
Chief of Division

Washington, D. C.,
October 17, 1934.

These specifications supersede specifications for minimum thermometers dated October 23, 1930.

